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ABSTRACT

Data collection and analyses of college records and interviewing provided a cross-sectional view of data flow and information transmission in a small college. The micro-analysis of interview data, forms, and reports yielded a picture of functional relationships, clarified loci of decision making, and stipulated functions served by data items. These became instruments to the identification of critical issues and problem areas. The macro-analysis of the superstructure and policies combined with the policy implications from the external environment yielded a contextual framework for the self analysis. The observations of the study group provided the institution a skeletal reconstruction of its record system. The greatest contributions were descriptions of organizational conditions that had to be addressed as both policy and operational issues. Through the interviews it became clear that each administrator, staff, and faculty member viewed the system, its priorities, effectiveness and efficiency from his reference point in the organizational scheme. By following the information flow it was determined that the admissions office played a key role in establishing and collecting information. The interview sessions also made it possible to identify trouble spots and areas of misinformation. Planning toward an automated information system is considered. (SW)

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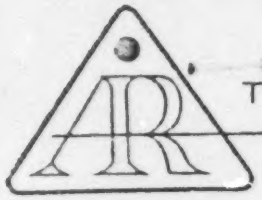

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PLANNING AN INFORMATION SYSTEM FOR A SMALL COLLEGE

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INTRODUCTION:

Since the evangelical waves of the early 19th century receded, the small "college on the hill" has been a fixture in the educational landscape of this nation. Even today, more than 40 percent of our institutions of higher education report enrollments of less than 1,000 students, and 23 percent have less than 500 enrolled.[1] While it is true that these small institutions serve only five percent of the U. S. student population, each of them must meet its payroll and solve its problems of management and records every day. What follows is a report of how one such college moved toward the establishment of an automated information system with the assistance of a consulting team.

The project has three characteristics that hold utility and interest for other institutions. First, it was firmly rooted in the reality of current practice with the result that participants learned about their own system before moving toward alternatives. Second, there was an emphasis on the policy base of information systems and provision for attention to policy issues. Third, the project produced a plan and procedure for the staff of the college to complete the development of an information program by using its own resources.

Until the recent period small colleges were able to share most of the curricular and operational changes which came to higher education. In the contemporary era, however, say the last 15 years,

many new ideas in postsecondary education carry prerequisites of size and wealth before participation can even be considered. Educational technology, the "preparatory" activities in seeking federal funds, and the multiple options of a rich career-based curriculum do not come easily for a staff of an institution with only 500 students. In a like manner the diffusion of management information systems to small colleges has faced a threshold raised by the high cost of hardware, the developmental expenses for software, and the complexity of implementation procedures.[2]

But technology has a way of answering its own questions. The rapid onset of mini-computers has reduced many of these thresholds and even brought advantage with delay. The flexibility of both hardware and software services has reached the point where technical questions no longer dominate the transition to automation or determine the nature of the decision. The college that is able to analyze its own environments, policies, needs, and procedures can translate them into a workable information system.

Now the prerequisite is understanding of what actually occurs and what should be going on. Working from the premise that institutional self knowledge is the key to such a transition, a four person team of research assistants from the Center for the Study of Higher Education, The Pennsylvania State University worked with the staff of a small college to produce a prototype procedure for self analysis. The paragraphs to follow consider: first, the current system for dealing with information collection, storage, and transmission; second, the external environment and its policy considerations; and third, the elements of a plan for self development toward a

rational automated information system.

DEFINING THE NATURE OF THE EXISTING SYSTEM BY ANALYSIS OF CURRENT PRACTICE.

The study team reviewed the official documents and reports and met with the two top administrators at the college. On the basis of this introduction, members of the team reached certain assumptions, impressions, and presumptive conclusions. These first reactions to the organizational structure, communication patterns, and the decision pathways were to be tested through an extensive program of interviews and data collection and analyses from college records.

The principal source of the college was tuition income, therefore the main line of analysis concentrated on the flow of student information from the Admissions Office through the Alumni Office. All staff and faculty members holding program responsibilities were interviewed by a two member team of research assistants. The material collected at each interview included: (1) Individual reports of what information items were judged to be most important to a particular office and (2) Forms and copies used to collect, record, and transmit data provided by the student or collected from other agencies (e. g. state and federal financial aid agencies). The major focus of all interviews was the information flow paths through offices and their points of origin and destination. Other areas addressed included: administrative and program priorities, functional responsibilities, time utilization, personnel and resource capability and utilization, satisfaction with the existing method of operation and receptiveness to change.

Through the interviews it became clear that each administrator, and staff and faculty member viewed the system, its priorities, its effectiveness and efficiency from his or her reference point in the organizational scheme. This proved to be quite complex in a small college where a department or division head generally assumed dual functions of chief administrator and technical expert under a workload that left little time for analysis or change.

By following the information flow it was determined that the Admissions office played a key role in establishing and collecting information; financial procedures were more important than academic record keeping procedures; student personnel records and alumni were a very minor part of the information process as it existed. Looking specifically at admissions data, the final point of use turned out to be the director of a specialized academic program, such as Nursing or Art, where the key decisions on enrollment and admission were made by a single person at the head of the program.

The interview sessions also made it possible to identify trouble spots and areas of misinformation among the participants. The team was able to reassess the administrative hierarchy in terms of the relative importance each office held in the transmission and origination of information. As it turned out this differed not only from the team's assumptions, but from the organizational structures and the informal perceptions of staff members of the institution. By reviewing the forms, record sheets, and reports, to ascertain their meaning and cross-referencing this information with interview data a paradigm of the current system was constructed.

The general analysis was used to focus on systemwide issues and key patterns that had to be addressed as policy issues which actually touched upon

the fundamental nature of the institution. From the macro-analysis it was concluded that the college was operating in almost every area at the very limits of its procedures.

This conclusion was supported by a chain of interrelated conditions.

a) Information paths were general rather than specific with the result that most offices received many more information items than they needed or wanted.

b) Procedures which generated a lot of non-specific information and dispersed it to units with small staffs and little clerical support resulted in heavy personal workloads for key administrators.

c) The system as a whole was highly vulnerable to changes in personnel, loss of time, small mistakes, and high cost operations.

d) The condition of system overload produced a wide-spread practice of handling many cases as exceptions. This in turn generated among the students expectations of a great deal of personal attention even on trivial administrative matters, a condition mistakenly viewed as high-quality service to students.

e) The flow of information was largely uncontrolled with the result that some items handled in a clearly inappropriate manner. For example, of the physical examination data about nursing candidates was readily available as part of general files.

f) Another product of system overload was the poor level of understanding among all users about the way in which information was collected and transmitted. One consequence of this inadequate knowledge was that the college was unable to effectively meet the enrollment and record keeping requirements for new bodies of students or potential students. For example, a program of short-term workshops was under consideration which would bring a sizeable number of one-time students to the campus. The record and billing system would be severely threatened by such a decision. Additionally, increased part-time enrollments raised fixed costs with only marginal yields of income. Each of these preliminary observations was viewed as a proposition to be tested by further inquiry. At this stage the team also looked carefully at standard packaged software programs which might answer some of these conditions.[3] It was concluded, however, that the college would benefit from several preliminary steps before looking seriously at any one design.

The assessment of the current system made by the study team occurred on two levels. The first, the macro-analysis accompanied by an understanding of the external environment established the contextual framework from which the micro-analysis of the data flow through the organization could be accurately studied. Although information was gathered about reporting and summarizing procedures, the team during its initial investigation did not develop the "institutional research" aspect of the process to identify periodic reports and aggregated data summaries that might be needed.

THE EXTERNAL ENVIRONMENT AND ITS POLICY IMPLICATIONS

Developments in the external environment in recent years have placed new demands on information systems and the record keeping processes of colleges. Federal and state reporting requirements, for HEGIS, financial aid agencies, planning commissions, accreditation as well as recent court decisions, legislation and administrative law dictate that colleges must maintain, preserve, report and provide access to certain records. Because neither public or private institutions can easily claim exemption from most provisions, colleges are wise to give attention to legal requirements in detail and in the planning stages rather than to undertake costly revisions under duress. If the NDSL experience with loan payback is taken as an indicator most small colleges have not had time to absorb this flood of requirements that flows from the administrative law surrounding such federal programs.

Legislation has addressed record keeping indirectly as well as directly. Though the intent of the Affirmative Action Guidelines is equal opportunity and non-discrimination they also contain specific regulations that emphasize the importance of accurate and up-to-date information.[4] Such requirements are generalizeable to many areas of record keeping and suggest a systematic approach to all information tracks. They require that when requested, (1) records must be submitted unconditionally, (2) records must be maintained where they are safe, (3) records must be accessible, (4) records must be opened to review at any time by an appropriate government agency.

In the area of student records the Buckley Amendment[5] has brought the issues of "access" and "confidentiality" to the forefront.

In addition to requiring confidentiality of records, access must be guaranteed so that a student can challenge and/or add to the factual basis of any entry contained in records, files and/or data. The right to challenge goes beyond literal accuracy to include assurance that records are not misleading.

Recent judicial decisions concerning student dismissal, and discrimination in colleges and universities have emphasized further the importance of record keeping. By focusing on whether college procedures have been followed rather than examining the policies on which records are based, courts have considered college standards substantially matters of professional judgment.[6] Courts have posed the additional question of whether due process was followed. Generally, this has meant a heavy reliance upon: (1) a clear statement of existing policy, (2) evidence of consistence in written documents, (3) evidence that procedures are supported by existing samples of records.[7] Thus, accurate and efficient records are generally what the courts have looked for to accept the professional judgment of administrators and faculty.

Headed by the National Task Force on Better Information for Student Choice another influence is changing the types of record keeping necessary for colleges as well as the access and presentation of that information. Designed to improve student decision making, "Project Choice" calls for systematic efforts to re-examine present informational sources and needs of students and to develop more new, student oriented material to be more accurate and relevant in depicting the unique character of a college.[8] The strong movement to a "consumer" approach to student information suggests that in the near future many

more colleges will be developing new types of information currently not accessible to assist students, institutions and the public.

These examples are only a few of the more obvious demands of the external environment which reflect the complexity and importance of understanding the external domain, and its policies, laws and changes. Together these forces are a strong reminder that the information system must be (1) based on a policy that recognizes administrative law, legislation and consumer interests (2) reflect procedures that are consistent with that policy and (3) be conducted in a consistent and even handed manner. A record keeping system must meet the needs of students, faculty and staff as well as many other criteria unknown to most individuals the system serves.

INFORMATION PATTERNS AND THE INTERNAL TASK ENVIRONMENT

Utilizing a micro-analytic approach the study team gathered a "cross sectional" view of the existing information system at the college. From a detailed review of what information items each form contained, where they traveled, and what functions they served, a pattern of self-development for rationalizing the information system was constructed. Applying this pattern entails: (1) identifying in complete detail all information items gathered and the instruments of collection; (2) describing the flow paths of information and the functions served by information at each station; (3) re-evaluating the needs of each station for information items; and (4) constructing a new system built around a data core and embodied in a set of carefully labeled and coordinated forms.

A set of work sheets basic in principle, are fundamental to the subsequent analyses and permit the construction of new and more economical form. They were developed to be used by the College and the team to implement steps one and two which consisted of the following:

1. Identifying existing information items and their means of collection and exchange. A careful, but not exhaustive review of the forms used by various offices allowed the identification of more than 100 information items about an individual student. These items (e.g. name, sex, permanent address, etc.) were grouped in columnar form on work sheets. The collection forms on which these information items actually appeared were arrayed on the work sheets as well. Utilizing these work sheets information items could be referenced in terms of their collection instruments (Appendix A).

2. Describing the flow paths of information and specifying the functions they serve at each location. Again, work sheets were utilized describing which collection forms were transmitted to other offices in the original or by copy and which offices had access by inspection or formal review. Through this process, data was charted from the entry point into the system and its flow through the college. Information transfers and exchanges were also traced from one office to another and from one record to another (Appendix B).

The sample worksheets developed by the team for the admissions office and for academic records were traced out completely. They established a prototype process which could be carried out as a self-study project by the college staff.

A PLAN FOR SELF-ASSESSMENT AND ADJUSTMENT

The cross-sectional view of the existing information system developed by the study team gives a perspective different from that which is open to members of the faculty and staff. An analysis of this type is the key to an orderly procedure by which those within the college can obtain the same cross-sectional view in more detail and with objective precision to rationalize the information system. The process or self-assessment and adjustment consists of three interrelated steps which require different types of involvement of the various individuals in the college. In this plan data from the internal environment and the external consideration are integrated through the formulation and implementation of institutional policies and procedures.

1. The formulation of institutional policy and procedures dealing with collection, maintenance, preservation, and disclosure of information about individual students and aggregate student data. From an operational viewpoint, the clarification and publication of such a policy position is fundamental to a clear definition of student records. This step is frequently over looked by those planning an automated data system but in today's climate it is of paramount importance. From a legal viewpoint, the Buckley Amendment (Section 438 of the General Education Provision Act) requires compliance of educational institutions which receive any funds, including those paid to students. A fundamental examination of the record keeping process and the federal requirements in this area can produce long range benefits and economies for the study and development of information systems, including the enrichment of the relationship between

informed and concerned faculty and students, and added efficiency by utilizing the legal requirements as guidelines for the policy to be established.

The college must become familiar with the Buckley Amendment regulations. Specific attention must be given to its definition of "education records" including records as any data recorded or directly related to students that are maintained by the college. This includes information in any medium, not only print, but also, tape, files which are hand written, microfilm and microfiche.[9] The policy specifies that colleges must go beyond generalities to inform students of their rights to privacy as well as to inspect and review their educational records. The policy minimally requires provisions that must be met in the formulation of record keeping policies. For example, fees for the copying of records must be stated, the types and locations of educational records must be listed and the titles and addresses of individuals responsible for the records must be stipulated. The policy goes on to specify that colleges must communicate this information to students and parents at least once a year.[10] Thus, it is obvious that there is both breadth and specicicity dictated by law, a condition that requires a college to develop a basic policy before the process of review of institutional record is begun. Colleges also need procedures to insure the removal of unnecessary and sometimes illegal questions as well as the culling and destroying of unnecessary data held in files. Toward these ends each office reviewed sample work sheets developed by the study team and laid out information patterns from their offices through the work sheets. Where information was exchanged between offices

representatives from both offices had to meet and discuss the needs and issues entailed in both operations.

Clearly, extensive involvement of faculty members, administrators and staff in the process is time well spent. Their input and review will strengthen the policies and procedures while they further their understanding of policy and its application of the official record keeping system as well as their personal notations and files.

2. The appointment of a task force and coordinator to continue the steps toward automation. The organizational vehicle for self study was to be a task force of about six members. The task force would insure steady progress through the next logical step and disseminate knowledge to those with responsibility for student information flow. It also has the responsibility of focusing on general policy issues, including the publication and dissemination of the record keeping policy and dealing with areas that are clearly beyond the scope of any one office. Through the support of the chief executive and through the membership of prestigous and knowledgeable individuals the task force is the major catalyst and impetus to the completion of the project.

The task force coordinator must be invested with executive responsibility and authority to recommend policy changes and to promote actions through the transition period. The coordinator must (1) posses a sound understanding of academic procedures, sensitivity to student services, and an awareness of the fiscal requirements of an information system; (2) rationalize, integrate, and adjust current practices with particular attention to the points of exchange between offices; and (3) actively participate in the collection of information of various computer units and their capabilities.

Members of the task force must assume responsibility for providing advice and recommendations to the coordinator, policy statements to deal with the operation of student information, and recommendations of organizational adjustments including both changes in structure and function to implement the process of transition.

The time table for complete self-assessment and adaptation is one calendar year. A realistic schedule for moving toward automation can easily be developed into a PERT program spanning twelve months. Members of the college community should be apprised of the project status at regular intervals to assure on-going communication and to increase understanding and support of the changes.

Month	Activity
1	Existing information has been examined and tested. New sets of forms have been prepared. Existing equipment has been scheduled for maximum effectiveness.
4	Draft of a policy statement on student records has been prepared. A review of intra-office functions and needs is completed. Consideration of appropriate computer equipment is begun.
9	Manual and computer parallel procedures are begun.
10 & 11	Debugging, instruction, and adjustment take place.
12	Computer operations begin as the primary information system with a manual support system.

3. The identification of official reporting points and construction of a manual system for data collection and transmission. All of the information processed through offices is collected through analysis of their forms and displayed on the worksheets. By describing the flow of information through an office along with the specifications of function it serves at each point, an overview of the input and the output decision making will be constructed. The aggregated data can now serve as the basis for determining (1) the specific decision and action responsibilities of each office (2) the importance of information items for decisions (3) the generator and depository of different information items (4) functions and processes that can be centralized to reduce repetition (5) information items that not used and should be discarded (6) information items that are illegal or undesirable and must be removed (7) prime time for gathering specific types of information (8) additional information items to be collected.

The complexity and sensitivity of the task, consisting as it does of a rationalized restructuring of the decision making processes insures that a closer liaison will be established among the offices and officers of the college. From this analytical process printed forms will be created along with procedures of exchange, maintenance, and preservation of records for the new manual and computer operations.

The governing principle through the self-assessment and adaptation phase is that offices which are the loci of record keeping will make final decisions within the policy guidelines and in consultation with the steering committee. This approach reinforced by the combined efforts of the task force and participating offices will yield a basic integrated information system. It will have streamlined current

practices and will be capable of being operated in manual mode and replaced by an automated system.

Summary and Conclusion

The college that is able to analyze its own environments, policies, needs and procedures can translate them into a workable manual information system adaptable to computer applications. An external study team contributes to this process by stimulating a college to: (1) understand the realities of its current environment (2) produce a plan for analysis (3) complete the development of an information program by using its own resources.

Through an extensive program of interviews and data collection and analyses of college records the study team for this project developed a cross-sectional view of data flow and information transmission. The micro-analysis of interview data, forms and reports yielded a picture of functional relationships, clarified loci of decision-making, and stipulated functions served by data items. In turn these became instruments to the identification of critical issues and problem areas. The macro-analysis of one organizational climate, the superstructure, and policies combined with the policy implications from the external environment yielded a rich contextual framework for the self-analysis.

Additionally, the observations of the study group provided the institution a skeletal reconstruction of its record system. The greatest contributions, however, were descriptions of organizational conditions which had to be addressed as both policy and operational issues.

Once the elements of a plan for self-development had been prepared the critical point of the project was reached. Those tasks the college had to address in order to develop policies and procedures for student records, to identify reporting points, and to construct a new manual system for adaptation for computerization could then be implemented through the efforts of an internal task force. Thoroughness, accuracy, and a critical analyses were essential to determine the implications of external policy needs, to increase individual and collective understanding of the operations and needs of the college, to describe the data flow, and eventually to remove illegal or unnecessary information items, and add missing information. Ultimately, to be successful, the entire project had to be tied closely with a receptivity to change, commitment at the executive level, diligence of the task force members, and involvement of staff and faculty directly associated with the student information flow.

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8. See Elaine H. El-Khawas, Better Information for Student Choice: Report of a National Task Force. Washington: National Task Force on Better Information for Student Choice, 1977.

9. See 20 U.S.C. 1232g §99.3.

10. See 20 U.S.C. 1232g §99.6.

APPENDIX A

Analysis of
Admissions Forms

COMPREHENSIVE LIST OF
INFORMATION ITEMS

	Forms on which Data are Gathered	A-1 "The Card" (six copies)	A-2 Blue Sheet for Student Folder	A-3 (Yellow) Application--Audit	A-4 (Blue) Faculty/Staff Application Form	A-5 Medical History and Examinat	A-6 Medical History and Examinat Nursing Only	A-7 Interest Sheet "I want to know more"	A-8 Withdrawal Form	A-9 Admission to Controller List (Reservation?)	A-10 Admission to Controller List (Application)
Name		✓	✓	✓	✓	✓	✓				
Permanent address		✓		✓	✓	✓	✓				
Permanent phone		✓		✓	✓	✓	✓				
Social security or other ID no.		✓		✓	✓		✓				
Sex				✓	✓	✓	✓				
Curriculum		✓	✓								
Residential status		✓	✓								
Term entered		✓	✓								
Veteran											
Date of birth				✓	✓	✓					
Place of birth							✓				
Term of Application											
Action Sequence: Accepted, paid		✓									
Full-time		✓		✓	✓						
Part-time		✓		✓	✓						
High school attended		✓	✓	✓	✓						
Date high school graduation			✓	✓	✓						
College(s) attended		✓		✓	✓						
Date of previous application											
Reserved--paid											
Date application fee paid											
GED score		✓		✓	✓						
GED date			✓	✓	✓						
SAT/ACT scores (CEEB:V&M)		✓	✓								
SAT/ACT subscores		✓	✓								
SAT/ACT date											
Other scores (AP, CLEP, etc.)											
High school rank		✓									
High school QPA--year		✓									
Senior year courses and grades											
Final high school QPA											
Names & addresses references IQ											
Vocational objectives											
Activity since high school											
With whom do you now reside											
Address											
Legal guardian											
Father's name		✓									
Father living											
Father's address											

Student information items appear in row form on the left side of the worksheet. Forms on which data are gathered are listed in columnar form at the top of worksheet. Check marks represent the forms where information is collected.

APPENDIX B

Admissions Addressees / COLLECTION INSTRUMENT	Users of Original								Recipients of Copies						Access to File					Final Custody					
	Admissions	Registrar	Controller	Curriculum Chairman	Financial Aid	Other																		
A-1 "The Card" (six copies)																								
A-2 Blue Sheet for Student Folder																								
A-3 (Yellow) Application-- Audit Form																								
A-4 (Blue) Faculty/Staff Application Form																								
A-5 Medical History & Exam.																								
A-6 Medical History & Exam. Nursing Only																								
A-7 Interest Sheet "I want to know more"																								
A-8 Withdrawal Form																								
A-9 Admission to Controller List (Reservation?)																								
A-10 Admission to Controller List (Application)																								

Collection instruments for student information items appear in row form on the left side of the worksheet. Addressees are listed in columnar form at the top of the worksheet. Check marks represent the dissemination and access of forms to describe flow of admissions data.